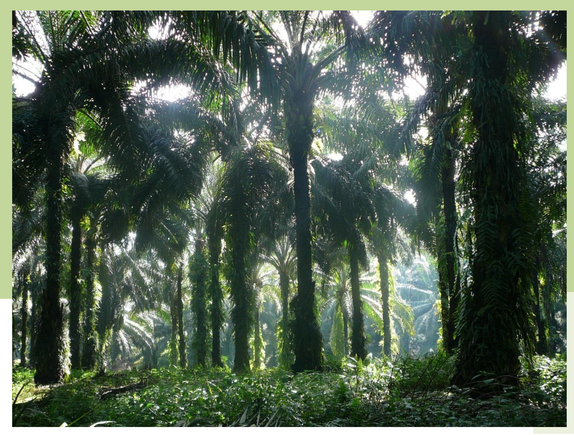


Spatial distribution of small carnivores within oil palm plantations

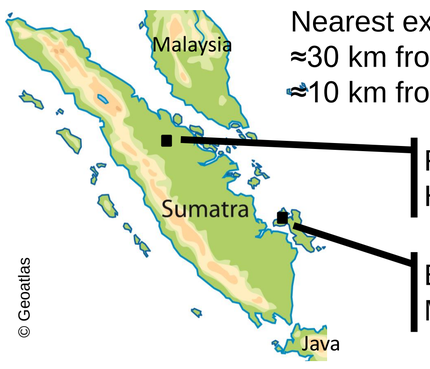
Verwilghen A.[1], Jennings A.P.[2], Veron G.[3], Raoul F.[4], Naim M.[5], Aryawan A.A.K.[5], Advento A.D.[5], Sudharto Ps[5], Caliman JP.[5,1], Giraudoux P.[4,6]

[1] CIRAD, UPR Systèmes de pérennes, F-34398 Montpellier, France
[2] Small Carnivores – Research and Conservation, Portland ME 04101, USA
[3] UMR 7205 CNRS MNHN UPMC EPHE, ISYEB, MNHN, 75231 Paris, France
[4] Chrono-environnement CNRS/Université de Franche-Comté, 25030 Besançon, France
[5] Smart Research Institute, Pekanbaru 28112, Indonesia
[6] Institut Universitaire de France, 75005 Paris, France

Correspondence:
aude.verwilghen@cirad.fr
smallcarnivores@yahoo.com

Small carnivores may contribute to rat control in oil palm plantations, in Southeast Asia. Knowledge on their distribution and habitat preference would provide guidance for promoting the presence of small carnivores within oil palm landscapes. Are they found deep within the oil palm, or near oil palm edge i.e. closer to other habitats? Are they attracted by forest?

Agro-industrial plantations (4,000 ha – 5,000 ha)



Nearest extensive natural forest (>5000ha):
≈30 km from Riau site
≈10 km from Bangka site (but peatswamp forest)

Riau Site - 2 plantations
Homogeneous oil palm landscape

Bangka Site - 2 plantations
More diversified landscape

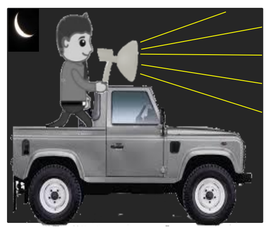
Methods

Spotlight counts

Faeces counts

Riau and Bangka plantations - Dry season - 3 years

Fixed transects or routes along representative plantation roads:
- faeces counts: 31 to 46 km /plantation, once a year
- spotlight counts: 84 to 119 km /plantation, 2 to 3 times/year



Camera trapping

Riau plantations - 1 full year

Above ground camera traps opportunistically deployed at 11 and 7 sites in each plantation respectively; 3164 camera trap days

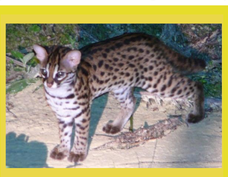
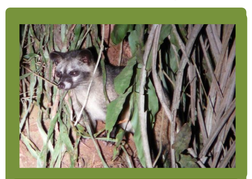
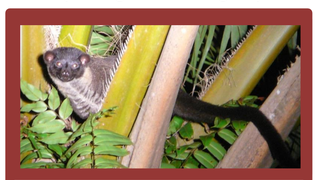
Spatial distribution

Euclidian shortest distance from observations to focal habitats (forest fragments and oil palm edge, within 15 km surrounding the plantation border). Attractive effect of focal habitat?

Occupancy estimate

Occupancy modelling with two covariates:
- distance to oil palm edge
- distance to extensive area of lowland forest

Species encountered

Leopard cat (*Prionailurus bengalensis*)	Common palm civet (*Paradoxurus hermaphroditus*)	Small-toothed palm civet (*Arctogalidia trivirgata*)	Malay civet (*Vivera tangalunga*)
			
132	**78**	**5**	**4**
241	**44**	**0**	**5**
23	**0**	**0**	**0**

388 (no reliable species identification → community level only)

Spotlight observations	night time
Camera traps independent photos	night time day time
Faeces observations	

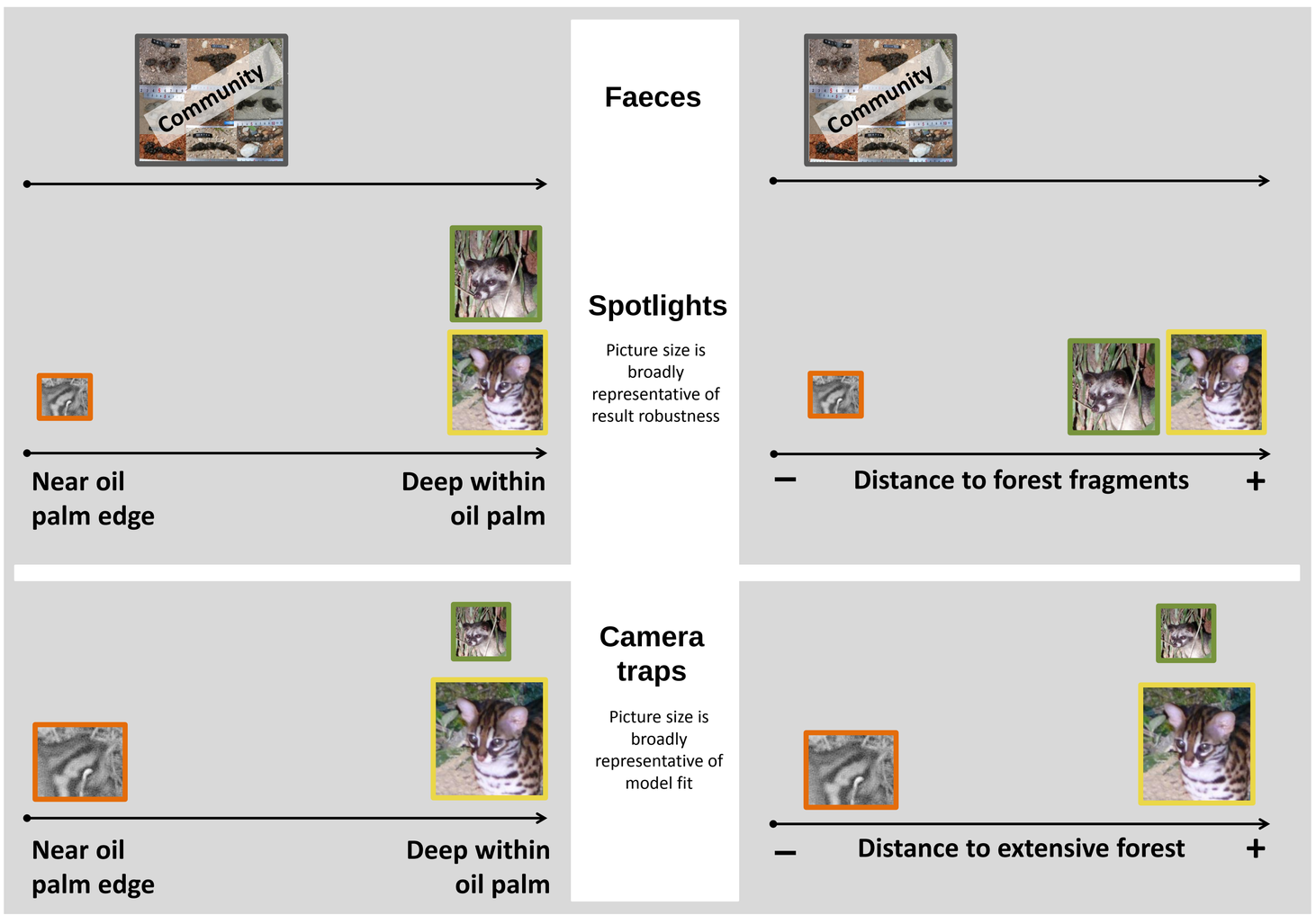
Distribution

Our results suggest that:

Forest fragments are important for the small carnivore community, but level of dependency varies among species

The oil palm plantation is important for food forage at night for the leopard cat and the common palm civet

- ✓ Community level (faeces): small carnivores were significantly attracted by forest fragments
- ✓ Leopard cat and common palm civet: may be found deep within the oil palm, at least during night time. Distance from the oil palm edge (i.e. from other habitats) or from forest habitat (forest fragments or extensive forest) did not significantly affect their distribution (spotlights) or occupancy rate (camera traps).
- ✓ During day time, 87% of leopard cat detections (camera traps): recorded ≤ 0.2 km from oil palm edge
- ✓ Malay civet: only detected along or near oil palm edge
- ✓ Small-toothed palm civet: no characteristic distribution pattern detected and low number of individuals observed



Question arising: What could be suitable sites for the leopard cat to rest within the oil palm plantation during the day?

Perspectives

Creating suitable rest sites and increasing habitat heterogeneity throughout the plantation, including forest fragments and corridors, might encourage some small carnivores to utilise oil palm

These results are part of a PhD work (A.Verwilghen, 2015. Rodent pest management and predator communities in oil palm plantations in Indonesia: a comparison of two contrasting systems) and of a complementary survey with camera traps (Jennings *et al.*, 2015. Diversity and occupancy of small carnivores within oil palm plantations in central Sumatra, Indonesia. Mammal Research, 60(3), pp.181-188.)